LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, IT, ECE, EEE & ME) under Tier - I
College Code: 76

MASTER OF BUSINESS ADMINISTRATION
COURSE HANDOUT

PART-A

Name of Course Instructor	: **M r s . Y N A G A M A N I**	
Course Name & Code	: **MEFA-23HS02**	
L-T-P Structure	: 2-0-0	Credits: 2
Program/Sem/Sec	: CIVIL (A/Sec)., IV-Sem.	A. Y : 2025-26

Prerequisite: Basic Knowledge in business activities.

COURSE EDUCATIONAL OBJECTIVES(CEO):

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview of investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Define the concepts related to Managerial Economics, Financial Accounting and Management. **(Understand-L2)**
CO2	Understand the fundament also Economics viz., Demand, Production, cost, revenue and markets. **(Understand-L2)**
CO3	Apply the Concept of Production cost and revenues for effective Business decision **(Apply-L3)**
CO4	Evaluate the capital budgeting techniques **(Analyze-L4)**
CO5	Develop accounting statements and evaluate the financial performance of business entity. **(Analyze-L4)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2	3	2													
CO3			2												
CO4				2		2									
CO5					2										
1 - Low						**2 –**Medium						**3 -** High			

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi. 4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Business Economics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Orientation	1	4/12/26		TLM1	CO1	T1,R2	
2.	Orientation	1	6/12/26		TLM1	CO1	T1,R2	
3.	Introduction to Economics	1	11/12/26		TLM2	CO1	T1,R2	
4.	Explaining about CO-PO	1	13/12/26		TLM2	CO1	T1,R2	
5.	Definitions of Economics-Scarcity, Growth, Nature and Scope of Economics	1	18/12/26		TLM1	CO1	T1,R2	
6	Demand-Law of demand	1	20/12/26		TLM2	CO1	T1,R2	
7	Elasticity of demand	1	27/12/26		TLM2	CO1	T1,R2	
8	Types of Elasticity of demand	1	1/1/26		TLM2	CO1	T1,R2	
9	Demand Forecasting - Methods of demand forecasting	1	3/1/26		TLM3	CO1	T1,R2	
No. of classes required to complete UNIT-I		09		No. of classes taken:				

UNIT-II: Theory of Production and Cost analysis

S.No.	Topics to be covered	No. of Classes Requi red	Tentative Date of Completion	Actual Date of Compl etion	Teach ing Learn ing Metho ds	Learni n g Outco m e COs	Text Book follow ed	HOD Sign Weekly
1.	Production Function	1	8/1/26		TLM2	CO2	T1,R2	
2.	Isoquant and Isocost	1	10/1/26		TLM1	CO2	T1,R2	
3.	Least Cost Combination of inputs	1	15/1/26		TLM1	CO2	T1,R2	
4.	Law of Returns	1	17/1/26		TLM2	CO2	T1,R2	
5.	Internal and External Economies of Scale	1	22/1/26		TLM2	CO2	T1,R2	
6.	Cost Concepts	1	22/1/26		TLM1	CO2	T1,R2	
7.	Break-even Analysis	1	24/1/26		TLM2	CO2	T1,R2	
8	BEP Problems	1	24/1/26		TLM2			
No. of classes required to complete UNIT-II		07		No. of classes taken:				

UNIT-III: Markets & Pricing Policies

S.No.	Topics to be covered	No. of Classes Requi red	Tentativ e Date of Completi on	Actual Date of Completi on	Teach ing Learn ing Metho ds	Learni n g Outco m e COs	Text Book followe d	HOD Sign Wee k ly
1.	I Mid exam		26/1/26		TLM1	CO3		
2.	I Mid exam				TLM1	CO3		
3.	I Mid exam				TLM1	CO3		
4.	I Mid exam		31/1/26		TLM1	CO3		
5.	Market structures	1	5/2/26		TLM1	CO3	T2,R4	
6.	Markets-Types of markets	1	7/2/26		TLM1	CO3		
7.	Features and price out determinations under Perfect competition	1	12/2/26		TLM2	CO3		
8.	Features and price out determinations under Monopoly	1	14/2/26		TLM1	CO3		
9.	Features and price out determinations under Monopolistic competition	1	19/2/26		TLM1	CO3		
10.	Pricing –Pricing polices & its Objectives	1	21/2/26		TLM1	CO3	T2,R4	
11.	Pricing Methods and its applications in business.	1	26/2/26		TLM2	CO3	T2,R4	
No. of classes required to complete UNIT-III		11		No. of classes taken:				

UNIT-IV: Capital and Capital Budgeting

S. No.	Topics to be covered	No. of Classes Requi red	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Nature and its significance	1	28/2/26		TLM2	CO4	T2,R4	
2.	Types of Capital	1	5/3/26		TLM2	CO4	T2,R4	
3.	Sources of raising capital	1	7/3/26		TLM1	CO4	T2,R4	
4.	Capital budgeting Significance	1	12/3/26		TLM1	CO4	T2,R4	
5.	Capital budgeting Process	1	14/3/26		TLM2	CO4	T2,R4	
6.	Techniques of Capital Budgeting (non-discounted cash flow techniques and discounted cash flow of techniques).	2	19/3/26 21/3/26		TLM2	CO4	T2,R4	
No. of classes required to complete UNIT-IV		7		No. of classes taken:				

UNIT-V: Financial Accounting and analysis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Complete	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Accounting – significance- Book Keeping -Double entry system	2	26/3/26 28/3/26		TLM1	CO5	T2,R4	
2.	Journal- Ledger	2	2/4/26		TLM1	CO5	T2,R4	
3.	Trial Balance	1	2/4/26		TLM1	CO5	T2,R4	
4	Final Accounts with simple adjustments	2	4/4/26		TLM2	CO5	T2,R4	
5	Financial Statement Analysis through ratios	1	4/4/26		TLM2	CO5	T2,R4	
6	II Mid exams		6/4/26					
7.	II Mid exams							
8	II Mid exams							
9.	II Mid exams		11/4/26					
No. of classes required to complete UNIT-V		08		No. of classes taken:				

Content beyond syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Complete on	Actual Date of Completion	Teaching Learning Methods	Learning Outcom e COs	Text Book followed	HOD Sign Week ly
1.	Financial accounting	1	26/12/25					
2.	Behavioral economics	1	6/02/26					
		02						

Teaching Learning Methods			
TLM1	Chalk and talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

Part – C- EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II)	**A1=5**
I-Descriptive Examination (Units-I, II)	**M1=15**
I-Quiz Examination (Units-I, II)	**Q1=10**
Assignment-II (III, IV & V)	**A2=5**
II- Descriptive Examination (Unit-III, IV & V)	**M2=15**
II-Quiz Examination (Unit-III, IV & V)	**Q2=10**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	**70**
Total Marks = CIE + SEE	**100**

PART-D: PROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

Program Outcomes (POs):

PO 1:	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5:	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Mrs. Y NAGAMANI	Mrs. Y NAGAMANI	Dr. Adi Sesha Reddy	Dr. K. Deepika
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade
NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category)
NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)
NBA Accredited under Tier-I (ASE, CE,CSE, EEE, ECE,IT & MECH)
Recognized as Scientific Industrial Research Organization(SIRO) by DSIR
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.
Department of Civil Engineering

COURSE HANDOUT
PART-A

Name of Course Instructor : Eeshwar Ram .J
Course Name & Code : 23CE04 - ENGINEERING GEOLOGY
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec. : B.Tech., Civil IV-Sem., A.Y : 2025-26

Pre-requisites: NIL

Course Objectives: The objective of this course is:

1. To know the importance of Engineering Geology to the Civil Engineering.
2. To enable the students understand what minerals and rocks are and their formationand identification.
3. To highlight significance/ importance/ role of Engineering Geology in constructionof Civil Engineering structures.
4. To enable the student realize its importance and applications of Engineering Geologyin Civil Engineering constructions.
5. concepts of Groundwater and its geophysical methods.

Course Out comes: At the end of the course, the student will be able to:
CO1: Understand and interpret fundamental geological processes and geological formations. (Understand)
CO2: Differentiate various properties of minerals and rocks. (Understand)
CO3: Illustrate geological structural features (Understand)
CO4: Understand geological principles in civil engineering applications. (Understand)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	1	2	1	-	-	-	-	-	1	2		
CO2	1	1		2	2	1	-	-	-	-	-	1		1	
CO3	1	-	-	1	2	1	1	1	-	-	-	1			
CO4	1	-	-	1	1									1	2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

TEXTBOOKS:

1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications. 2 ndEdn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8 th 2023

REFERENCES:

1. Engineering Geology by SubinoyGangopadhay Oxford University press 1 st edition, 2012.
2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2 ndEdn , 2017, Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013) Pearson publications.
3. 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

Web Materials:

http://nptel.iitm.ac.in/video.php?subjectId=105105106
http://nptel.iitm.ac.in/video.php?courseId=1055&p=1
http://nptel.iitm.ac.in/video.php?courseId=1055&p=3
http://nptel.iitm.ac.in/video.php?courseId=1055&p=4

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: DEFINITIONS & Introduction-Geology

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction- Geology- Discusssion on CEO & CO's	1	**01-12-2025**		**TLM1**	
2.	Introduction: Branches of Geology,	1	**02-12-2025**		**TLM1**	
3.	Mineralogy, Petrology	1	**04-12-2025**		**TLM1**	
4.	Structural Geology, Civil Engineering Geology	1	**08-12-2025**		**TLM**	
5.	Mining Geology, Economic Geology	1	**09-12-2025**		**TLM21**	
6.	Hydrology and Physical geology	1	**11-12-2025**		**TLM1**	
7.	Importance of Geology in Civil Engineering with case studies,	1	**15-12-2025**		**TLM2**	
8.	Weathering of rocks,	1	**16-12-2025**		**TLM2**	
9.	Geological agents,	1	**18-12-2025**		**TLM2**	
10.	weathering process of Rock,	1	**22-12-2025**		**TLM2**	
11.	Rivers -Navigations	1	**23-12-2025**		**TLM2**	
12.	Rivers and geological work of rivers	1	**29-12-2025**		**TLM2**	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: Mineralogy and Petrology

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Mineralogy And Petrology: Definitions of mineral and rock	1	**30-12-2025**		**TLM2**	
2.	Different methods of study of mineral and rock	1	**31-12-2025**		**TLM2**	
3.	Physical properties of minerals and rocks for megascopic study for the following minerals and rock	1	**05-01-2026**		**TLM2**	
4.	Common rock forming minerals: Feldspar, Quartz Group	1	**06-01-2026**		**TLM2**	
5.	Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite	1	**08-01-2026**		**TLM2**	
6.	ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite	1	**19-01-2026**		**TLM2**	
7.	Classification, structures ,textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks,	2	**20-01-2026**		**TLM2**	
8.	r megascopic study of granite varieties, (pink, gray, green)	1	**22-01-2026**		**TLM2**	
9.	Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone	1	**02-02-2026**		**TLM2**	
10.	Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.	1	**03-02-2026**		**TLM2**	
No. of classes required to complete UNIT-II:10				No. of classes taken:		

UNIT-III: Structural Geology:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Structural Geology-Inroduction	1	**04-02-2026**			
2.	Strike ,Dip- Introduction- importance	1	**05-02-2026**			
3.	Outcrop study of common geological structures	1	**09-02-2026**			
4.	Associating with the rocks-	1	**10-02-2026**			
5.	Folds- Introduction -Importance	1	**11-02-2026**			
6.	Faults-- Introduction -Importance	1	**12-02-2026**			
7.	Joints impotance and Unconformities nature	1	**16-02-2026**			
8.	Joint parts – specifications	1	**17-02-2026**			
9.	Joint-types- classifications	1	**18-02-2026**			
10.	Joints-mechanism and their importance in Civil Engineering.	1	**19-02-2026**			
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT- IV: Ground Water-Earthquakes and Land Slides-Geophysics:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Ground Water- Water table	1	**23-02-2026**			
2.	Cone of depression	1	**24-02-2026**			
3.	Geological controls of Ground Water Movement	1	**26-02-2026**			
4.	Ground Water Exploration Techniques.	1	**02-03-2026**			
5.	Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells	1	**05-03-2026**			
6.	Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.	1	**09-03-2026**			
7.	Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method	1	**10-03-2026**			
8.	Electrical methods, Seismic methods, Radiometric method and Electrical resistivity	1	**11-03-2026**			
9.	Seismic refraction methods	1	**12-03-2026**			
10.	Engineering properties of rocks.	1	**16-03-2026**			
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V: Geology of Dams, Reservoirs and Tunnels:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Types of Dams,	1	**17-03-2026**			
2.	Purpose of Dams	1	**18-03-2026**			
3.	Geological considerations in the selection of a Dam site	1	**23-03-2026**			
4.	Geology consideration for successful constructions of reservoirs	1	**24-03-2026**			
5.	Life of Reservoirs	1	**25-03-2026**			
6.	Purpose of Tunnelling	1	**26-03-2026**			

7.	Tunnelling- effects	1	**26-03-2026**			
8.	Lining of Tunnels	1	**27-03-2026**			
9.	Influence of Geology for successful Tunnelling	1	**30-03-2026**			
10.	Tunnelling overview.	1	**02-04-2026**			
No. of classes required to complete UNIT-V:11				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS :

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
CIE-I (Mid-I, Assignment-I. Quiz-I)	30
CIE-II (Mid-II, Assignment-II. Quiz-II)	30
Cumulative Internal Examination (CIE): 80% best and 20% least	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Course Coordinator	Module Coordinator	HOD
J. Eeshwar Ram	J. Eeshwar Ram	B Narasimha Rao	Dr. K V Ramana

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I) & ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: B RAMA KRISHNA
Course Name & Code **:** Concrete Technology & 23CE05
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech., IV-Sem., Civil **A.Y.:** 2025-26

PREREQUISITE: Building Materials

Course Objectives Upon successful completion of this course, the student will be able to
1. Learn materials and their properties used in the production of concrete
2. Learn the behavior of concrete at fresh stage
3. Learn the behavior of concrete at hardened stage
4. Learn the influence of elasticity, creep and shrinkage on concrete
5. Learn the mix design methodology and special concretes

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1:	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field. (Remember)
CO2:	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method. (Understand)
CO3:	Determine the ingredients of concrete through lab test results. realize the importance of quality of concrete (Understand)
CO4:	Understand the behaviour of concrete in various environments. (Understand)
CO5:	Familiarize the basic concepts of special concrete and their production and applications. (Remember)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	2	-	-	-	-	-	2	-	2
CO2	-	-	-	-	2	-	2	-	-	-	-	-	-	2	3
CO3	1	-	-	-	2	-	1	-	-	-	-	-	-	2	3
CO4	1	-	-	1	-	-	2	-	-	-	-	-	-	-	2
CO5	1	-	-	3	1	2	2	-	-	-	-	2	-	-	3
1 - Low					**2** –Medium							**3 -** High			

Textbooks:

1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.

Reference Books:

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi
5. Concrete Technology by Job Thomas, Cengagae Publications, 1st edition, 2015

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Cement and Aggregates

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Syllabus and Cos	1	03-12-2025		TLM1	
2.	Introduction to cement	1	04-12-2025		TLM1	
3.	Hydration and structure	1	05-12-2025		TLM1	
4.	Tests on cement	1	06-12-2025		TLM1	
5.	Grades of cement , Admixtures	1	11-12-2025		TLM1	
6.	Accelerators, Retarders	1	12-12-2025		TLM1	
7.	plasticizers, super plasticizers	1	13-12-2025		TLM1	
8.	Introduction to aggregates	1	18-12-2025		TLM1	
9.	Classification, size and shape	1	19-12-2025		TLM1	
10.	Tests on aggregates	1	20-12-2025		TLM1	
11.	Grading of aggregates, Quality of mixing water	1	26-12-2025		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Fresh Concrete

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Fresh concrete	1	27-12-2025		TLM1	
2.	Manufacturing of concrete Properties of fresh concrete	1	02-01-2026		TLM1	
3.	Workability	1	03-01-2026		TLM1	
4.	Segregation and bleeding	1	08-01-2026		TLM1	
5.	Mixing and Vibration	1	09-01-2026		TLM1	
6.	RMC	1	10-01-2026		TLM1	
7.	Shotcrete	1	22-01-2026		TLM1	
No. of classes required to complete UNIT-II:07				**No. of classes taken:**		

UNIT-III: Hardened Concrete

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to hardened concrete	1	23-01-2026		TLM1	
2.	W/C ratio and G/S ratio	1	24-01-2026		TLM1	
3.	Maturity concept, Strength of hardened concrete	1	05-02-2026		TLM1	
4.	Relation between compression & tensile strength	1	06-02-2026		TLM1	
5.	Curing	1	07-02-2026		TLM1	
6.	Compression test, Tension test	1	12-02-2026		TLM1	
7.	Flexure test, Splitting test	1	13-02-2026		TLM1	
8.	Non-destructive testing methods – Codal provisions for NDT.	1	14-02-2026		TLM1	
No. of classes required to complete UNIT-III: 08				**No. of classes taken:**		

UNIT-IV: ELASTICITY, CREEP & SHRINKAGE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	18-02-2026		TLM1	
2.	Modulus of elasticity	1	19-02-2026		TLM1	
3.	Dynamic modulus of elasticity – Poisson's ratio	1	20-02-2026		TLM1	
4.	Creep of concrete	1	21-02-2026		TLM1	
5.	Factors influencing creep , Relation between creep & time	1	26-02-2026		TLM1	
6.	Effects of creep	1	27-02-2026		TLM1	
7.	Shrinkage	1	28-02-2026		TLM1	
No. of classes required to complete UNIT-IV: 07				**No. of classes taken:**		

UNIT-V: MIX DESIGN AND SPECIAL CONCRETES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	05-03-2026		**TLM1**	
2.	RMC	1	06-03-2026		**TLM1**	
3.	Fibre reinforced concrete, HPC	1	07-03-2026		**TLM1**	
4.	Self -consolidating concrete	1	12-03-2026		**TLM1**	
5.	Self-healing concrete.	1	13-03-2026		**TLM1**	
6.	Factors in the choice of mix proportions	1	14-03-2026		**TLM1**	
7.	Statistical methods, Acceptance Criteria	1	20-03-2026		**TLM1**	
8.	Concepts Proportioning of concrete mixes by ACI method and IS Code method	1	27-03-2026		**TLM1**	
9.	Mix design	1	28-03-2026		**TLM1**	
10.	Design problems	1	01-04-2026		**TLM1**	
11.	Revision	1	01-04-2026 02-04-2026 04-04-2026			
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyse and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Course Coordinator**	**Module coordinator**	**Head of the Department**
Name of the Faculty	**B. Ramakrishna**	**B. Ramakrishna**	**Dr C Raamallu**	**Dr. K.V. Ramana**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr K.V.Ramana
Course Name & Code : STRUCTURAL ANALYSIS & 23CE06
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., CE., IV-Sem., A.Y : 2025-26
PRE-REQUISITE : Engineering Mechanics and Strength of Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs): Structural analysis is an analytical approach for finding the internal forces, different structural components and their structural behavior due to applied external loads.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Apply energy theorems to analyze trusses **(Apply)**
CO 2	Determine unknown reactions of indeterminate structures by using Castigliano's–II Theorem **(Apply).**
CO 3	Compute the internal forces of members in fixed and continuous beams **(Apply)**
CO 4	Evaluate the internal forces of members portal frames by using slope-deflection method **(Apply)**
CO5	Analyze continuous beams and portal frames by using Moment – distribution method **(Apply)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										2	3		2
CO2	3	2										2	3		2
CO3	3	2										2	3		2
CO4	3	2										2	3		2
CO5	3	2										2	3		2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

TEXTBOOKS:

1. Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers. 3rd edition2017.

REFERENCE BOOKS:

1. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.PPerumal– Laxmi publications. 3rd 2016.
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis – D.S.Prakasarao -Univeristy press.
5. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I Energy Theorems::

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Revision of EM principles	1	01-12-2025		1	
2.	Revision of SM principles	1	02-12-2025		1	
3.	Overview of Structural analysis	1	04-12-2025		1	
4.	Strain energy due to bending moment- example	1	08-12-2025		1	
5.	Castigliano's first theorem-	1	09-12-2025		1	
6.	Deflections in Cantilevers	1	11-12-2025		1	
7.	Deflections in Simple beams	1	15-12-2025		1	
8.	Deflections in Simple beams	1	16-12-2025		1	
9.	Deflections in trusses	1	18-12-2025		1	
10.	Practice problems	1	22-12-2025		1	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: Analysis of indeterminate structures:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Static indeterminacy of beams, frames	1	23-12-2025		1	
2.	Kinematic indeterminacy of frames, trusses, beams	1	29-12-2025		1	
3.	Castigliano's second theorem-applications to trusses	1	30-12-2025		1	
4.	Tutorial on Indeterminate trusses	1	05-01-2026		1	
5.	Castigliano's second theorem-applications to trusses	1	06-01-2026		1	
6.	Tutorial on Indeterminate trusses.	1	08-01-2026		1	
No. of classes required to complete UNIT-II: 6				**No. of classes taken:**		

UNIT-III: FIXED BEAMS & CONTINUOUS BEAMS:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction -fixed beams-differential equations approach	1	19-01-2026		1	
2.	Fixed beam with central point load	1	20-01-2026		1	
3.	Fixed beam with eccentric point load	1	22-01-2026		1	
4.	Fixed beam with UVL and couple	1	02-02-2026		1	
5.	Fixed beam with combined loads	1	03-02-2026		1	

6.	Fixed beam with couple	1	05-02-2026		1	
7.	Moment area method	1	09-02-2026		1	
8.	Effect of sinking and rotation in fixed beams	1	10-02-2026		1	
9.	Derivation of three moment theorem	1	12-02-2026		1	
10.	Continuous beams with overhang	1	16-02-2026		1	
11.	Continuous beams with both ends fixed	1	17-02-2026		1	
12.	Continuous beams with varying MI	1	19-02-2026		1	
13.	Continuous beams with support settlement	1	23-02-2026		1	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV SLOPE-DEFLECTION METHOD:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to slope deflection method	1	24-02-2026		1	
2.	Analysis of continuous beams by slope deflection method	1	26-02-2026		1	
3.	Effect of sinking in slope deflection method		02-03-2026		1	
4.	Effect of sinking in slope deflection method	1	03-03-2026		1	
5.	Analysis of frames by slope deflection method without	1	05-03-2026		1	
6.	Analysis of Beams by SDM	1	09-03-2026		1	
7.	Analysis of frames by slope deflection method without settlement	1	10-03-2026		1	
8.	Analysis of frames by slope deflection method without settlement	1	12-03-2026		1	
No. of classes required to complete UNIT-V: 8				**No. of classes taken:**		

UNIT-V: MOMENT DISTRIBUTION METHOD:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Moment distribution method	1	16-03-2026		1	
2.	Analysis of continuous beams by Moment distribution method	1	17-03-2026		1	
3.	Analysis of continuous beams by Moment distribution method	1	19-03-2026		1	
4.	Analysis of continuous beams by Moment distribution method	1	23-03-2026		1	

5.	Effect of sinking in Moment distribution method	1	24-03-2026		1	
6.	Effect of sinking in Moment distribution method	1	26-03-2026		1	
7.	Analysis of frames by Moment distribution method without settlement	1	30-03-2026		1	
8.	Analysis of frames by Moment distribution method without settlement	1	31-03-2026		1	
9.	Analysis of frames by Moment distribution method without settlement	1	02-04-2026		1	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23Regulations):

Evaluation Task	**Marks**
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr. K. V. Ramana	Dr. K. V. Ramana	Dr.C.Rajamallu	Dr. K. V. Ramana
Signature				

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College Code: 76

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PART-A

Name of Course Instructor : J.Rangaiah

Course Name & Code : H&HM (23CE07)

L-T-P Structure : 3-0-0 Credits : 3

Program/Sem/Sec : CIVIL., IV-Sem. A.Y : 2025-26

Prerequisite: Fluid Mechanics,

Course Educational Objectives: In this course, the students will learn

1. To Introduce concepts of laminar and turbulent flows
2. To Illustrate principles of uniform and non-uniform flows through openchannel.
3. To impart knowledge on design of turbines and pumps

Course Outcomes (COs): At the end of the course, students will be able to

CO1: Understand the characteristics of laminar and turbulent flows. (Understand)

CO2: Understand the fundamentals in open channel flow (Understand)

CO3: Apply the knowledge of fluid mechanics to solve the uniform and non-uniform flow problems in open channels. (Apply)

CO4: Understand the principles, losses and its efficiencies of centrifugal pumps (Understand)

CO5: Determine the performance of impact of jets on plates, Pelton wheel, and Francis turbine and centrifugal pump (Apply)

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1

1=Slight(low) 2=Moderate (Medium) 3=Substantial (High)

Textbooks: -

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, LaxmiPublications (P)Ltd., New Delhi 11th edition, 2024.
2. P. N. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.

References:

1. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGrawHill, 2nd edition 2018
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition ,2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery,Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, SChakraborty 3rd edition 2011

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: LAMINAR & TURBULENT FLOW IN PIPES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction and CO,PO, syllabus	1	01-12-25		TLM1	CO1	T1	
2.	Laminar flow through: circular pipes	1	04-12-25		TLM1	CO1	T1	
3.	Problems	1	06-12-25		TLM1	CO1	T1	
4.	Laminar flow through: annulus	1	08-12-25		TLM1	CO1	T1	
5.	Laminar flow through: parallel plates	1	11-12-25		TLM1	CO1	T1	
6.	Problems	1	13-12-25		TLM1	CO1	T1	
7.	Stoke‘s law, Measurement of viscosity Reynolds experiment,	1	15-12-25		TLM1	CO1	T1	
8	Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth pipes	1	18-12-25		TLM1	CO1	T1	
9	Resistance to flow of fluid in rough pipes- Moody‘s diagram	1	20-12-25		TLM1	CO1	T1	
10	Introduction to boundary layer theory	1	22-12-25		TLM1	CO1	T1	
No. of classes required to complete UNIT-I		10		No. of classes taken:				

UNIT-II: UNIFORM FLOW IN OPEN CHANNELS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Comparison between open channel flow and pipe flow, geometrical parameters of a channel	1	27-12-25		TLM1	CO2	T1	
2.	classification of open channels, & open channel flow, Velocity Distribution of channel section	1	29-12-25		TLM1	CO2	T1	
3.	Hydraulically efficient channel sections: rectangular	1	03-12-25		TLM1	CO2	T1	
4	Problems		05-01-26		TLM1	CO3	T1	
5	Hydraulically efficient channel sections: trapezoidal	1			TLM1	CO2	T1	
6	Problems	1	08-01-26		TLM1	CO3	T1	
7	Hydraulically efficient channel sections: triangular	1	20-01-26		TLM1	CO2	T1	
8	Problems Energy and Momentum correction factors	1	22-01-26		TLM1	CO3	T1	
9	Problems		24-01-26		TLM1	CO3	T1	
No. of classes required to complete UNIT-II		9		No. of classes taken:				

UNIT-III: NON-UNIFORM FLOW IN OPEN CHANNELS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth	1	02-02-26		TLM1	CO2	T1	
2.	Problems	1	05-02-26		TLM1	CO3	T1	
3.	Measurement of Discharge & Velocity	1	07-02-26		TLM1	CO2	T1	
4.	Dynamic Equation of Gradually Varied Flow	1	09-02-26		TLM1	CO2	T1	
5.	Problems	1	12-02-26		TLM1	CO3	T1	
6.	Hydraulic Jump and classification Elements& characteristics of Hydraulic Jump, Energy dissipation.	1	14-02-26		TLM1	CO2	T1	
7.	Problems	1	16-02-26		TLM1	CO3	T1	
No. of classes required to complete UNIT-III		7		No. of classes taken:				

UNIT-IV: IMPACT OF JETS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Hydrodynamic force of jets on stationary flat, inclined and curvedvanes	1	19-02-26		TLM1	CO5	T1	
2.	Hydrodynamic force of jets on moving flat, inclined vanes	1	21-02-26		TLM1	CO5	T1	
3.	Problems	1	23-02-26		TLM1	CO5	T1	
4.	Hydrodynamic force of jets on moving curvedvanes	1	26-02-26		TLM1	CO5	T1	
5.	Problems	1	28-02-26		TLM1	CO5	T1	
6.	Velocity triangles at inlet and outlet Work done and efficiency	1	02-03-26		TLM1	CO5	T1	
7.	Classification of turbines Pelton wheel and its design	1	05-03-26		TLM1	CO5	T1	
8.	Francis turbine and its design	1	07-03-26		TLM1	CO5	T1	
9	Draft tube: theory Characteristic curves of hydraulic turbines. Cavitation: causes and effects.	1	09-03-26		TLM1	CO5	T1	
No. of classes required to complete UNIT-IV		9		No. of classes taken:				

UNIT-V: PUMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Working principles of a centrifugal pump	1	12-03-26		TLM1	CO4	T1	
2.	work done by impeller; heads, losses and efficiencies	1	14-03-26		TLM1	CO4	T1	
3.	Problems	1	16-03-26		TLM1	CO5	T1	
4.	minimum starting speed Problems	1	23-03-26		TLM1	CO4	T1	
5.	Priming; specific speed; limitation of suction lift	1	28-03-26		TLM1	CO4	T1	
6.	net positive suction head (NPSH)	1	30-03-26		TLM1	CO4	T1	
7.	Performance and characteristic curves Cavitation effects	1	02-04-26		TLM1	CO4	T1	
8	Multistage centrifugal pumps; troubles and remedies	1	04-04-26		TLM1	CO4	T1	
No. of classes required to complete UNIT-I				No. of classes taken:				

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART – C- EVALUATION PROCESS:

Evaluation Task	**Marks**
Assignment-I (Units-I, II)	**A1=5**
I-Descriptive Examination (Units-I, II)	**M1=15**
I-Quiz Examination (Units-I, II)	**Q1=10**
Assignment-II (III, IV & V)	**A2=5**
II- Descriptive Examination (Unit-III, IV & V)	**M2=15**
II-Quiz Examination (Unit-III, IV & V)	**Q2=10**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	**70**
Total Marks = CIE + SEE	**100**

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	01-12-2025	24-01-2026	8 W
I Mid Examinations	26-01-2026	31-01-2026	1 W
II Phase of Instructions	02-02-2026	04-04-2026	9 W
II Mid Examinations	06-04-2026	11-04-2026	1 W
Preparation and Practical's	13-04-2026	18-04-2026	1 W
Semester End Examinations	20-04-2026	02-04-2026	2 W

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: P. Mohanaganga Raju
Course Name & Code : Building Materials and Construction & 23MC02
L-T-P Structure : **3-0-0** **Credits:** -
Program/Sem/Sec : B.Tech., IV-Sem., CE-A **A.Y.:** 2025-26

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course aims to provide study of the properties, making and applications of basic civil engineering materials such as stones, bricks, lime, cement and wood. The course also provides an insight into the different types masonry work used in construction practice, various building components and building finishing activities.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1:	Understand the preparation process and the composition of construction materials such as Stones, bricks and timber. **(Understand)**
CO2:	Describe the sources, constituents and storage of lime and cement for their appropriate usage as building materials based on their specific attributes. **(Understand)**
CO3:	Identify the different components in a building and their specific purpose in the building. **(Remember)**
CO4:	Classify the various types of mortars, masonry components and finishings used in the buildings. **(Remember)**
CO5:	Identify the uses, good and faulty characteristics of different building materials. **(Remember)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	2	-	-	-	-	1	1	-	1
CO2	1	-	-	-	-	1	2	-	-	-	-	1	1	-	1
CO3	1	-	-	-	-	1	2	-	-	-	-	1	1	-	1
CO4	1	-	-	-	-	1	2	-	-	-	-	1	1	-	1
CO5	1	-	-	-	-	1	2	-	-	-	-	1	1	-	1
1 - Low						**2 –**Medium						**3 -** High			

Textbooks:

1. Rangwala “Engineering Materials (Material science)” Charotar Publishing House Pvt. ltd., Edition-2012
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain-“Building Construction”- Laxmi Publications (P) Ltd.

Reference Books:

1. S.K. Duggal "Building Materials"- - New age International Publisher, Fourth edition-2012
2. 2.R.K. Rajput "Engineering Materials (Including construction materials)"-, S.Chand Publications.
3. P.C Varghese "Building Construction" Prentice-Hall of India Private Ltd.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: STONES & BRICKS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction CO's & PO's, Subject	1	02-12-2025		**TLM2**	
2.	**Introduction-**classification of rocks-- characteristic of good building stone- Dressing of stones	1	06-12-2025		**TLM2**	
3.	Common building stones, their properties- compositions- uses.	1	09-12-2025		**TLM2**	
4.	**Bricks:** Composition of brick, constituents of brick earth-	1	13-12-2025		**TLM2**	
5.	Manufacturing process of bricks, characteristics of good building bricks	1	16-12-2025		**TLM2**	
6.	Classification of bricks- Fly ash bricks, hollow bricks – uses	1	20-12-2025		**TLM4**	
No. of classes required to complete UNIT-I: 06				**No. of classes taken:**		

UNIT-II: LIME AND CEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	**Lime -** Introduction-lime stone-limestone cycle-sources of lime-properties of lime-uses – constituent of lime	2	23-12-2025, 27-12-2025		**TLM2**	
2.	Classification of lime-precaution in handling of lime-storage of lime	1	30-12-2025		**TLM2**	
3.	**Cement**-Introduction –classification-properties of cements	1	03-01-2026		**TLM4**	
4.	Comparison between cement and lime-constituents of cement-functions of ingredients of cement	1	06-01-2026		**TLM2**	
5.	Out line of manufacture of Portland cement- field tests for cement	1	10-01-2026		**TLM2**	
6.	Types and uses of cements-storage of cements	1	17-01-2026		**TLM2**	
No. of classes required to complete UNIT-II: 07				**No. of classes taken:**		

UNIT-III: MORTAR AND MASONRY

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction- classification of mortars-characteristics of good mortar-Types of mortars	1	20-01-2026		**TLM2**	
2.	Preparation of mortar-Uses-Precautions in the uses of mortars	1	24-01-2026		**TLM2**	
3.	Types of masonry-joints in stone masonry	1	03-02-2026		**TLM2**	
4.	Different bonds in bricks-tools for brick laying- English and Flemish bonds-	1	07-02-2026		**TLM2**	
5.	Defects in brick masonry, importance of Cavity and Partition walls	1	10-02-2026		**TLM2**	
No. of classes required to complete UNIT-III: 05				**No. of classes taken:**		

UNIT-IV: BUILDING COMPONENTS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Components of a building – Substructure and superstructure	1	14-02-2026		**TLM2**	
2.	Importance of foundation-functions of foundations	1	17-02-2026		**TLM2**	
3.	Requirements of good foundations - different types of foundations, Purposes of foundation	2	21-02-2026, 24-02-2026		**TLM2**	
4.	Basic details of Lintels, Arches, walls, stair cases	1	28-02-2026		**TLM2**	
5.	Types of floors - types of roofs	1	03-03-2026		**TLM2**	
No. of classes required to complete UNIT-I: 06				**No. of classes taken:**		

UNIT-V: TIMBER AND FINISHINGS IN BUILDINGS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of timber trees, cross section of exogenous tree, seasoning of timber	1	07-03-2026		**TLM2**	
2.	Important types of timber and their uses, ply wood and its uses	1	10-03-2026		**TLM2**	
3.	**Paints**: Functions of paints-types of paints - constituents of paints	1	14-03-2026		**TLM2**	
4.	Characteristics of good paint-General precautions-defects in painting	1	17-03-2026		**TLM2**	
5.	**Damp proofing**: Introduction-effects of dampness	1	24-03-2026		**TLM2**	
6.	Methods of damp proofing –material used for D.P.C and treatment in buildings	1	28-03-2026		**TLM2**	
7.	Revision	1	31-03-2026		**TLM2**	
8.	Revision	1	04-04-2026		**TLM2**	
No. of classes required to complete UNIT-I: 06				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	-
Total Marks = CIE + SEE	30

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyse and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**P Mohanaganga Raju**	**Dr. C. Rajamallu**	**Dr. K. V. Ramana**
Signature			

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr K.V. Ramana /B Rama Krishna,
Course Name & Code : Concrete Technology Lab & 23CE54
L-T-P Structure : 0-0-3
Program/Sem : B. Tech / IV-Sem

Regulation : R23
Credits : 1.5
A.Y. : 2025-26

Pre-requisites: NIL
Course Objectives: Upon successful completion of this course, the student will be able to
To test basic properties of ingredients of concrete fresh and hardened concrete properties
Course Out comes: At the end of the course, the student will be able to:
CO1: Outline importance of testing cement and its properties (Apply)
CO2: Assess different properties of aggregates (Apply)
CO3: Assess fresh concrete properties and their relevance to hardened concrete (Apply)
CO4: Assess hardened concrete properties (Apply)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	3	1	3	2	-	-	-	-	-	-	1	1
CO2	-	-	-	3	1	3	2	-	-	-	-	-	-	2	2
CO3	-	-	-	3	1	3	2	-	-	-	-	-	-	3	3
CO4	-	-	-	3	1	3	2	-	-	-	-	-	-	3	2
1 - Low						**2** –Medium							**3 -** High		

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DEPARTMENT OF CIVIL ENGINEERING

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

List of Experiments

Cycle-I

1. Normal Consistency and Fineness of cement.
2. Initial setting time and Final setting time of cement.
3. Soundness of cement and Compressive strength of cement.
4. Grading and fineness modulus of Fine aggregate by sieve analysis.
5. Specific gravity of fine aggregate and bulking of sand
6. Grading of Coarse aggregate by sieve analysis.

Cycle-II

1. Workability of concrete by compaction factor method
2. Workability of concrete by slump test
3. Workability of concrete by Vee-bee test.
4. Compressive strength of cement concrete and Modulus of rupture
5. Young's Modulus and Poisson's Ratio
6. Split tensile strength of concrete.

Batches

Batch – A: 23761A0121 to 24761A0136
Batch – B: 24761A0137 to 25765A0112

BATCH A (Tuesday)	BATCH B (Friday)
A_1 -------23761A0121 to 24761A0104	B_1 ------24761A0137 to 24761A0141
A_2 -------24761A0105 to 24761A0109	B_2 ------ 24761A0142 to 24761A0147
A_3 ------ 24761A0110 to 24761A0117	B_3 -------24761A0148 to 24761A0152
A_4 --------24761A0118 to 24761A0124	B_4 -------24761A0153 to 24761A0157
A_5 --------24761A0125 to 24761A0129	B_5 -------24761A0158 to 25765A0104
A_6 --------24761A0130 to 24761A0136	B_6 -------25765A0105 to 25765A0112

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I CYCLE SCHEDULE: BATCH-A (Tuesday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
02-12-2025		Demo	Demo	Demo	Demo	Demo	Demo
09-12-2025		A1	A2	A3	A4	A5	A6
16-12-2025		A2	A3	A4	A5	A6	A1
23-12-2025		A3	A4	A5	A6	A1	A2
30-12-2025		A4	A5	A6	A1	A2	A3
06-01-2026		A5	A6	A1	A2	A3	A4
20-01-2026		A6	A1	A2	A3	A4	A5

I CYCLE SCHEDULE: BATCH-B (Friday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
05-12-2025		Demo	Demo	Demo	Demo	Demo	Demo
12-12-2025		B1	B2	B3	B4	B5	B6
19-12-2025		B2	B3	B4	B5	B6	B1
26-12-2025		B3	B4	B5	B6	B1	B2
02-01-2026		B4	B5	B6	B1	B2	B3
09-01-2026		B5	B6	B1	B2	B3	B4
23-01-2026		B6	B1	B2	B3	B4	B5

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DEPARTMENT OF CIVIL ENGINEERING

II CYCLE SCHEDULE: BATCH-A (Tuesday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
03-02-2026		A1	A2	A3	A4	A5	A6
10-02-2026		A2	A3	A4	A5	A6	A1
17-02-2026		A3	A4	A5	A6	A1	A2
24-02-2026		A4	A5	A6	A1	A2	A3
03-03-2026		A5	A6	A1	A2	A3	A4
10-03-2026		A6	A1	A2	A3	A4	A5
17-03-2026		***REPITATION LAB***					
24-03-2026		***REPITATION LAB***					
31-03-2026		***INTERNAL TEST***					

II CYCLE SCHEDULE: BATCH-B (Friday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
06-02-2026		B1	B2	B3	B4	B5	B6
13-02-2026		B2	B3	B4	B5	B6	B1
20-02-2026		B3	B4	B5	B6	B1	B2
27-02-2026		B4	B5	B6	B1	B2	B3
06-03-2026		B5	B6	B1	B2	B3	B4
13-03-2026		B6	B1	B2	B3	B4	B5
20-03-2026		***REPITATION LAB***					
27-03-2026		***REPITATION LAB***					
03-04-2026		***INTERNAL TEST***					

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DEPARTMENT OF CIVIL ENGINEERING

LAB TIMETABLE

Day	FN	AN
Monday		
Tuesday		IV Semester Batch- A
Wednesday		
Thursday		
Friday	IV Semester Batch- B	
Saturday		

Batch – A: 23761A0121 to 24761A0136
Batch – B: 24761A0137 to 25765A0112

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 10
Record = **B**	1,2,3,4,5,6,7,8	B = 05
Internal Test / Viva = **C**	1,2,3,4,5,6,7,8	C = 15
Cumulative Internal Examination: A + B + C = 30	1,2,3,4,5,6,7,8	**30**
Semester End Examinations = D **Procedure: 20 M; Experimental Work & Results: 30 M; Viva – Voce: 20 M**	1,2,3,4,5,6,7,8	**D = 70**
Total Marks: A + B + C + D = 100	1,2,3,4,5,6,7,8	**100**

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DEPARTMENT OF CIVIL ENGINEERING

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	**Module Coordinator**	**HOD**
Dr K V Ramana B Rama Krisna	Dr C Rajamallu	Dr K V Ramana

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DEPARTMENT OF CIVIL ENGINEERING

23CE55 - ENGINEERING GEOLOGY LAB

LIST OF EXPERIMENTS

COURSE: IV SEMESTER **A.Y: 2025-2026**

I CYCLE

1. Physical properties of minerals: Mega-scopic identification of
a. Rock forming minerals – Quartz group, Feldspar group, Garnet group,

bMicagroup & Talc,

Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…

c. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite,Chromite, etc….

II CYCLE

Introduction about Rocks and Formation

2. Megascopic description and identification of rocks.

a. Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite,Granite Poryphery, Basalt, etc.

b. Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale,Laterite, Conglamorate, etc.

c. Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite& Biotiteschist, Marble, Khondalite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc

Lab-In charge **HOD**

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DEPARTMENT OF CIVIL ENGINEERING

23CE55 - ENGINEERING GEOLOGY LAB

COURSE : IV SEMESTER **A.Y: 2025-2026**

I CYCLE SCHEDULE: BATCH-A

Exp / Date	I	II	III	IV	V	VI
02-12-2025	Demo	Demo	Demo	Demo	Demo	Demo
09-12-2025	A_1	A_2	A_3	A_4	A_5	A_6
16-12-2025	A_6	A_1	A_2	A_3	A_4	A_5
23-12-2025	A_5	A_6	A_1	A_2	A_3	A_4
30-12-2025	A_4	A_5	A_6	A_1	A_2	A_3
06-01-2026	A_3	A_4	A_5	A_6	A_1	A_2
20-01-2026	A_2	A_3	A_4	A_5	A_6	A_1

I CYCLE SCHEDULE: BATCH-B

Exp / Date	I	II	III	IV	V	VI
05-12-2025	Demo	Demo	Demo	Demo	Demo	Demo
12-12-2025	B_1	B_2	B_3	B_4	B_5	B_6
19-12-2025	B_6	B_1	B_2	B_3	B_4	B_5
26-12-2025	B_5	B_6	B_1	B_2	B_3	B_4
02-01-2026	B_4	B_5	B_6	B_1	B_2	B_3
09-01-2026	B_3	B_4	B_5	B_6	B_1	B_2
23-01-2026	B_2	B_3	B_4	B_5	B_6	B_1

Lab-In charge **HOD**

23CE55 - ENGINEERING GEOLOGY LAB

COURSE: IV SEMESTER **A.Y: 2025-2026**

II CYCLE SCHEDULE: BATCH-A

Date Exp	I	II	III	IV	V
03-02-2026	A_1	A_2	A_3	A_4	A_5
10-02-2026	A_1	A_2	A_3	A_4	A_5
17-02-2026	A_5	A_1	A_2	A_3	A_4
24-02-2026	A_4	A_5	A_1	A_2	A_3
10-03-2026	A_3	A_4	A_5	A_1	A_2
17-03-2026	A_2	A_3	A_4	A_5	A_1
24-03-2026	Pending / Repetition				
31-03-2026	***INTERNAL***				

II CYCLE SCHEDULE: BATCH-B

Exp / Date	I	II	III	IV	V
06-02-2026	B_1	B_2	B_3	B_4	B_5
13-02-2026	B_1	B_2	B_3	B_4	B_5
20-02-2026	B_5	B_1	B_2	B_3	B_4
27-02-2026	B_4	B_5	B_1	B_2	B_3
06-03-2026	B_3	B_4	B_5	B_1	B_2
13-03-2026	B_2	B_3	B_4	B_5	B_1
21-03-2026	Pending / Repetition				
27-03-2026	***INTERNAL***				

Lab-In charge **HOD**

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23CE55 - ENGINEERING GEOLOGY LAB

COURSE: IV SEMESTER **A.Y: 2025-2026**

BATCH:A	BATCH:B
A1 -----24761A0101 To 24761A0106	B_1 ----24761A0136 To 24761A0141
A2 -----24761A0107 To 24761A0113	B_2 ---- 24761A0142-2765A0146
A3 -----24761A0114 To 24761A0120	B3--- 2761A0147 -2761A0152
A4 ----- 24761A0122To 24761A0126	B4---24761A0153--224765A0158
A5 ----- 24761A0128 To 24761A0129	B5---25765A0101--25765A0106
A6------24761A0130 To 24761A0135	B6 --- 25765A0107 – 25765A0113

Lab-In charge **HOD**

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DEPARTMENT OF CIVIL ENGINEERING

ENGINEERNIG GEOLOGY LAB -

COURSE: IV SEMESTER **A.Y: 2025-2026**

LAB TIME -TABLE

Day	FN	AN
Monday		
Tuesday		**IV Semester Batch- A**
Wednesday		
Thursday		
Friday	**IV Semester Batch- B**	
Saturday		

Batch – A: 23761A0101 to 23761A0136

Batch – B: 23761A0137 to 23761A0158, Lateral entry Students (LE's)

Lab-In charge **HOD**

COURSE ARTICULATION MATRIX(Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-		-	-	-	-	-	-	1	2	3	-
CO2	-	1	-	-	2	-	-	-	-	1	-	3	3	2	-
CO3	-	-	2	-	2	-	-	-	-	1	-	1	3	3	-
CO4	-	-	2	-	2	-	-	-	-	1	-	1	3	3	-

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: P.KEERTHI

Course Name & Code : Remote Sensing and GIS **Regulation**: R23
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : II B.TECH.,/II SEM **A.Y.:** 2025-26

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course is designed to

1. Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.

2. Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.

3. Introduce GIS software to understand the process of digitization, creation of thematic map from top sheets and maps.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Acquire knowledge about concepts of Remote Sensing and GIS application. (Understand-L2)
CO2	Perform digital image analysis and interpret digital image characteristics (Understand-L2)
CO3	Digitize and create thematic map and extract important features to calculate geometry(Apply-L3)
CO4	Illustrate the GIS applications for developing elevations using TIN/DEM and stream ordering map. (Apply-L3)
CO5	Apply GIS software to perform simple analysis f o r Civil Engineering problems (Apply-L3)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
1 - Low					**2 –**Medium						**3 -** High				

TEXTBOOKS:

T1	Kang – Tsung Chang, "Introduction to geographic information system", Tata McGraw-Hill Education Private Limited, 2007
T2	Srivastava G.S- "An Introduction to Geoinformatics" McGraw Hill Education (India) Private Limited 2014

REFERENCE BOOKS:

R1	Sujit Choudhury, Deepankar Chakrabarti, Suchandra Choudhury, "An Introduction to Geographic Information Technology" I.K. International Publishing House Pvt. Ltd. 2009
R2	Shivangi Somvanshi, Maya Kumari, "A Introduction to Remote Sensing and Its Applications", S.K. Kataria & Sons 2014.
R3	Basudeb Bhatta, "Remote sensing and GIS" Oxford University press, 2011
R4	S. Kumar, "Basics of Remote sensing and GIS", Laxmi Publications, 2016
R4	Remote sensing and Geographical Information Technology, NPTEL video lectures and web notes

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: INTRODUCTION TO REMOTE SENSING

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	History of remote sensing-Electromagnetic Radiation, Spectrum	1	03-12-2025		**TLM2**	
2.	Energy Interaction with Atmosphere, Earth Surfaces	1	10-12-2025		**TLM2**	
3.	Characteristics of Remote Sensing System- Sensor Resolutions, Advantages& Limitations	1	17-12-2025		**TLM2**	
4.	Platforms: Types of Sensors, Airborne Remote Sensing, Space borne Remote Sensing	1	24-12-2025		**TLM2**	
5.	IRS, LANDSAT, SPOT & Recent satellite	1	31-12-2025		**TLM2**	
6.	Digital Image Characteristics	1	07-01-2026		**TLM2**	
7.	Digital Image Data Formats: Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ)	1	21-01-2026		**TLM2**	
No. of classes required to complete UNIT-I: 07				**No. of classes taken:**		

UNIT-II: DIGITAL IMAGE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Visual Interpretation Elements-Preprocessing, Enhancement	1	04-02-2026		**TLM2**	
9.	Supervised classification, Unsupervised classification	1	11-02-2026		**TLM2**	
10.	Principles, Components and Applications of GIS	1	18-02-2026		**TLM2**	
11.	Map projections, Spatial Data Structures, Raster and Vector Data	1	25-02-2026		**TLM2**	
12.	Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis	1	04-03-2026		**TLM2**	
No. of classes required to complete UNIT-II:0 5				**No. of classes taken:**		

UNIT-III: GEOGRAPHIC INFORMATION SYSTEM

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations	1	11-03-2026		**TLM2**	
14.	Arithmetic Operators, Comparison and Logical Operators,	1	18-03-2026		**TLM2**	
15.	Conditional Expressions - Network Analysis: Components of network	1	25-03-2026		**TLM2**	
16.	Transportation network - Optimum path analysis.	1	01-04-2025		**TLM2**	
No. of classes required to complete UNIT-III: 04				**No. of classes taken:**		

List of Experiments:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	RS&GIS Demo	3	03-12-2025		**TLM4**	
2	Georeferencing a Top sheet or Map	3	10-12-2025		**TLM4**	
3	Digitization and Attribute table creation	3	17-12-2025		**TLM4**	
4	Creation of Thematic Map	3	24-12-2025		**TLM4**	
5	Calculation of Feature geometry – Length, Area & Perimeter.	3	31-12-2025		**TLM4**	
6	Contour map – developing TIN & DEM from Contour.	3	07-01-2026		**TLM4**	
7	Stream network – Stream ordering map.	3	21-01-2026		**TLM4**	
8	Watershed - calculate Hydro-geomorphologic parameters	3	04-02-2026		**TLM4**	
9	Transportation Network Map – Route analysis.	3	11-02-2026		**TLM4**	
10	Repeatation	3	18-02-2026		**TLM4**	
11	Revision	1	25-02-2026		**TLM4**	
12	Record writing	1	04-03-2026		**TLM4**	
13	Record writing	2	11-03-2026		**TLM4**	
14	Record writing	3	18-03-2026		**TLM4**	
15	Record writing	3	25-03-2026		**TLM4**	
16	Record writing	3	01-04-2025		**TLM4**	
17	Lab internal exam	3	15-04-2026		**TLM4**	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day-to-Day Work	A1 = 10
Record & Observation	B1 = 5
Internal Exam	C1 = 15
Cumulative Internal Examination (CIE): A1+B1+C1	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problem
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**P. KEERTHI**	**P.KEERTHI**	**J.RANGAIAH**	**Dr.K.V.RAMANA**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor:	Dr.V. Ramakrishna, K.Harish Kumar	
Course Name & Code:	Design Thinking & Innovation (23ME57)	
Regulation	: R23	
L-T-P Structure	**:** 1-0-2	**Credits:** 02
Program/Sem/Sec	: B.Tech – IV Semester – A Section	**A.Y.:** 2025-26

PREREQUISITE: None

COURSE OBJECTIVES:

The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Apply fundamental design components, principles, and new materials to create and improve design projects. **(Applying-L3)**
CO2	Apply the design thinking process to develop and present innovative product solutions. **(Applying-L3)**
CO3	Analyze the relationship between creativity and innovation, evaluate their roles in organizations, and develop strategic plans for transforming creative ideas into innovative solutions**. (Analyzing-L4)**
CO4	Analyze to work in a multidisciplinary environment. **(Analyzing-L4)**
CO5	Apply design thinking principles to address business challenges, develop and test business models and prototypes, and evaluate the value of creativity. **(Evaluating-L5)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			3							2		3	
CO2	1	2	2		3							2		3	
CO3	3	3		2	3							3			3
CO4	1	1			3							2			3
1 - Low					**2 –**Medium							**3 -** High			

Textbooks:

1. K.V. Sambasiva Rao, Design Thinking and Innovation, Pen Press, 2024
2. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.

Reference Books:

1. Lecture Notes developed by the DTI Team
2. Shrrutin N Shetty, Design the Future, 1st Ed, Norton Press, 2018.
3. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.
4. William Lidwell, Kritinaholden, and Jill Butter, Universal Principles of Design, 2/e, Rockport Publishers, 2010.
5. Tim Brown, Change by Design, 1st Ed., Harper Bollins, 2009.
6. Chesbrough.H, The era of open innovation, 2003

Online Learning Resources:

• https://nptel.ac.in/courses/110/106/110106124/
• https://nptel.ac.in/courses/109/104/109104109/
• https://swayam.gov.in/nd1_noc19_mg60/preview
• https://onlinecourses.nptel.ac.in/noc22_de16/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	UNIT–I: INTRODUCTION TO DESIGN THINKING					
1	History of Design Thinking, New materials in Industry	1	1.12.2025		TLM2	
	Activity: To understand the importance of team work	2	1.12.2025		TLM6	
2	Introduction to elements and principles of Design	1	8.12.2025		TLM2	
	Activity: To understand the importance of design	2	8.12.2025		TLM6	
3	Basics of design-dot, line, shape, form as fundamental design components	1	15.12.2025		TLM2	
	Activity: Developing sketches using dot, line and form	2	15.12.2025		TLM6	
	UNIT–II: DESIGN THINKING PROCESS					
4	Design thinking process: Empathy	1	22.12.2025		TLM2	
	Activity: To understand the significance of Empathy	2	22.12.2025		TLM6	
5	Design thinking process: Define or Analyze	1	29.12.2025		TLM2	
	Activity: To understand the significance of Define/analyze	2	29.12.2025		TLM6	
6	Design thinking process: Ideate	1	5.1.2026		TLM2	
	Activity: To understand the significance of Ideate	2	5.1.2026		TLM6	
7	Design thinking process: Prototype	1	19.1.2026		TLM2	

	Activity: To understand the significance of Prototype	2	19.1.2026		TLM6	
8	Tools of design thinking in social innovations	1	19.1.2025		TLM2	
	Activity: Students should present their understanding of DTI elements using example	2	19.1.2026		TLM6	
	UNIT – III: INNOVATION					
9	Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations	1	2.2.2026		TLM2	
	Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation	2	2.2.2026		TLM6	
10	**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation	3	9.2.2026		TLM6	
	UNIT – IV: PRODUCT DESIGN					
11	Problem formation, introduction to product design, Product strategies, Product value	1	16.2.2026		TLM2	
	Activity: Development of Business models, setting of specifications	2	16.2.2026		TLM6	
12	**Activity:** Development of Business models, setting of specifications	3	23.2.2026		TLM6	
13	Product planning, product specifications. Innovation towards product design Case studies.	1	2.3.2026		TLM2	
	Activity: Explaining their own product and model design, case studies	2	2.3.2026		TLM6	
14	**Activity:** Explaining their own product and model design, case studies	3	9.3.2026		TLM6	
	UNIT – V: DESIGN THINKING IN BUSINESS PROCESSES					
15	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes	1	16.3.2026		TLM2	
	Activity: Marketing strategies of our own product, its maintenance, Reliability and plan for startup	2	16.3.2026		TLM6	
16	**Activity:** Marketing strategies of our own product, its maintenance, Reliability and plan for startup	3	23.3.2026		TLM6	
I Mid Exams: 26-01-2026 to 31-01-2025						
II Mid Exams: 06-04-2025 to 11-04-2025						
No. of classes required to complete: 45				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-B

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Internal Examination	30
Semester End Examination	70
Total Marks:	**100**

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory test required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Signature				
Name of the Faculty	Dr.V. Ramakrishna K. Harish Kumar	Dr V. Ramakrishna	J. Rangaiah	Dr. K.V. Ramana
Designation	**Course Instructors**	**Course Coordinator**	**Module Coordinator**	**HoD**